C25

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
15 August 2002 (15.08.2002)

PCT

(10) International Publication Number
WO 02/062414 A1

(51) International Patent Classification[7]: A61M 25/00

(21) International Application Number: PCT/US01/03713

(22) International Filing Date: 5 February 2001 (05.02.2001)

(25) Filing Language: English

(26) Publication Language: English

(71) Applicant and
(72) Inventor: LOIS, William, A. [US/US]; 2233 East 65th Street, Brooklyn, NY 11234 (US).

(74) Agent: KROLL, Michael, L.; 171 Stillwell Lane, Syosset, NY 11791 (US).

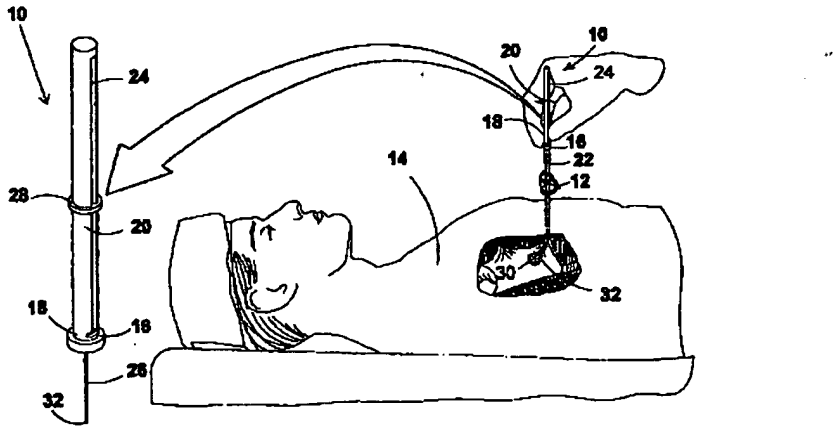
(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: CATHETER DE-CLOGGING DEVICE



(57) Abstract: A catheter cleaning device (10) for clearing a catheter (12) of obstructions. The catheter cleaning device (10) includes an elongate hollow housing (20) including first and second slots (24) extending along opposing sides thereof and first and second lateral slots (36) extending perpendicular to a respective one of the first and second slots (36), a guide member (28) encircling the housing (20) and including a bar (40) extending across a diameter thereof and through both the first and second slots (24), a guide wire (26) extending from the bar (40) and an adapter for connecting the device (10) to the catheter. The adapter (16) includes a recess (44) extending therethrough for the guide wire (26) to pass out of the housing (20) and into the catheter (12). The first and second lateral slots (36) allow for rotation of the guide member and thus turning of the guide wire (26). Turning of the guide wire (26) causes the guide wire (26) to scrape against the obstruction thereby breaking the obstruction into smaller pieces and clearing the catheter (12). The guide wire (26) has a length substantially equal to a length of the catheter (12) and an end of said guide wire (26) is able to bow upon contacting the obstruction.

WO 02/062414 A1

CATHETER DE-CLOGGING DEVICE

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates generally to catheters and, more specifically, to a device able to be readily connected to an end of a catheter for breaking up and removing obstructions within a lumen of the catheter and a method for breaking up an obstruction within a catheter.

Disclosure of the Invention

The present invention comprises a catheter cleaning device for clearing a catheter of obstructions is disclosed by the present invention. The catheter cleaning device includes an elongate hollow housing including first and second slots extending along opposing sides thereof and first and second lateral slots extending perpendicular to a respective one of the first and second slots, a guide member encircling the housing and including a bar extending across a diameter thereof and through both the first and second slots, a guide wire extending from the bar and an adapter for connecting the device to the catheter. The adapter includes a recess extending therethrough for the guide wire to pass out of the housing and into the catheter. The first and second lateral slots allow for rotation of the guide member and thus turning of the guide wire. Turning of the guide wire causes the guide wire

to scrape against the obstruction thereby breaking the obstruction into smaller pieces and clearing the catheter. The guide wire has a length substantially equal to a length of the catheter and an end of said guide wire is able to bow upon contacting the obstruction.

Brief Description of the Drawing Figures

Various other objects, features and attendant advantages of the present invention will become more fully appreciated as the same becomes better understood when considered in conjunction with the accompanying drawings, in which like reference characters designate the same or similar parts throughout the several views.

FIG 1 is a perspective view of the catheter cleaning device of the present invention connected to a catheter implanted in a patient having a blockage and an enlarged view of the catheter cleaning device of the present invention;

FIG 2 is a perspective view of the catheter cleaning device of the present invention;

FIG 3 is a perspective view of the catheter cleaning device of the present invention with the housing shown in dashed lines;

FIG 4 is a cross sectional view of the catheter cleaning device of the present invention;

FIG 5 is a cross sectional view of the catheter cleaning device of the present invention showing the extendible retractable member in an extended position whereby the guide wire is fully extended from the housing;

FIG 6 is a perspective view of the catheter cleaning device of the present invention immediately prior to being affixed to a catheter having an obstruction therein and an enlarged view of the obstruction within the blood vessel; and

FIG 7 is a perspective view of the catheter cleaning device of the present invention affixed to the catheter having an obstruction therein and an enlarged view of the obstruction within the blood vessel and the guide wire clearing the obstruction.

The reference numerals utilized in the various drawing figures are defined as follows.

10 catheter cleaning device of the present invention

12 catheter

14 patient

16 adapter

18 first end of the catheter cleaning device

20 housing

22 proximal end of catheter

24 slot along length of housing

26 guide wire

28 guide member

30 blockage within catheter

32 end of guide wire which is extended into the catheter

34 second end of housing

36 transverse slot

38 outer peripheral surface of guide member

40 bar extending across diameter of outer peripheral surface

42 central section of bar

44 funnel shaped recess in adapter

46 skirt extending from around funnel shaped recess

48 thread spiraling around inner side of skirt

50 inner side of skirt

52 arrow indicating direction of guide member and guide wire into extended position

54 arrow indicating length of guide wire

56 blood vessel

58 thread around distal end of catheter

60 arrow indicating direction of movement of device for connection to catheter

62 arrow indicating direction of rotation of device to engage with catheter

64 arrow indicating direction of movement of guide wire into extended position

Detailed Description of the Preferred Embodiment

Turning now descriptively to the drawings, in which similar reference characters denote similar elements throughout the several views, Figures 1 through 7 illustrate the catheter cleaning device of the present invention indicated generally by the numeral **10**.

The catheter cleaning device **10** is shown in Figure 1 releasably connected to a catheter **12** implanted in a patient **14**. An enlarged view of the catheter cleaning device **10** is shown on the right side of Figure 1. As can be seen from this figure, the catheter cleaning device **10** includes an adapter **16** extending from a first end **18** of a housing **20** for connecting the catheter cleaning device **10** to a proximal end **22** of the catheter **12**. Extending along a length of the housing **20** are a pair of opposing slots **24**, only one of the pair of slots **24** is visible from the angle shown in this figure. A guide member **28** is slidably connected to the housing **20** and rides along the length of the slots **24**. A guide wire **26** is connected to a guide member **28** and is caused to be extended from and retracted into the housing **20** as the guide member **28** slides along the length of the pair of opposing slots **24**. The guide member **28** is shown positioned at the first end **18** of the housing **20** with the guide wire **26** fully extended into the catheter **12** and engaging a blockage or obstruction **30** within the catheter **12**. The guide wire **26** is formed of a

material which allows an end **32** thereof to bow upon coming into contact with the blockage **30**.

A perspective view of the catheter cleaning device **10** is shown in Figure 2. This figure shows the guide member **28** positioned at a second end **34** of the housing **20** with the guide wire **26** in a fully retracted position within the housing **20**. At the base of the vertical slot **24** is a transverse slot **36**. The transverse slot **36** allows the guide member **28** to turn therein along with the guide wire **26** when placed in a fully extended position. When the guide wire **26** is in a fully extended position and contacts an obstruction **30** within the catheter **12** the guide member **28** may be turned causing the guide wire **26** to scrape against the obstruction **30** thereby breaking up the obstruction **30** and allowing for easy removal of the obstruction **30** from within the catheter **12**.

A view of the catheter cleaning device **10** with the housing **20** shown in dashed lines is illustrated in Figure 3. This view allows the components of the catheter cleaning device **10** positioned within the housing **20** to be viewed. As can be seen from this view the guide member **28** is positioned at the second end **34** of the housing **20** and the guide wire **26** is connected to extend therefrom and along the length of the housing **20**. The guide member **28** is preferably circular in shape and includes an outer peripheral surface **38** encircling the housing **20**. A bar **40** extends through the opposing slots **24** and across the diameter of the outer peripheral surface **38**. The guide wire **26** is connected to extend from a central section **42** of the bar **40**. The guide wire **26** is substantially equal to the length of the catheter cleaning device **10** such that when the

guide member **28** is in a fully retracted position at the second end **34** of the housing **20**, the guide wire **26** will be completely contained within the housing **20**. The adapter **16** is positioned at the first end **18** of the housing **20** and includes a funnel shaped recess **44** extending therethrough. The funnel shaped recess **44** acts as a guide for guiding the guide wire **26** out of the catheter cleaning device **10** and into the catheter **12** connected thereto.

A cross-sectional view of the catheter cleaning device **10** with the guide member **28** and guide wire **26** in the retracted position is shown in Figure 4. The guide member **28** and guide wire **26** are shown in the extended position in Figure 5. This figure shows the pair of slots **24** positioned on opposing sides of the housing **20**. The transverse slots **36** are shown connected to a respective one of the opposing slots **24** at the first end **18** of the housing **20**. The funnel shaped recess **44** is positioned below the transverse slots **36** at an exit point for the guide wire **26** from the housing **20**. Extending from a side of the funnel shaped recess **44** opposite the transverse slots **36** is a skirt **46** including a thread **48** spiraling around an inner side **50** thereof. The thread **48** is provided to engage a thread spiraling around an outer side of the distal end **22** of the catheter **12** to which the catheter cleaning device **10** will be connected. An arrow labeled with the numeral **52** is provided in Figure 4 to show the direction of movement for the guide member **28** and guide wire **26** into the extended position. The guide wire **26** is shown in the fully extended position with its length indicated by the arrow "L" labeled with the numeral **54** in Figure 5.

The operation of the catheter cleaning device **10** will now be described with reference to the figures and specifically Figures 6 and 7. In operation, the catheter cleaning device **10** is used for cleaning obstructions from within catheters **12** connected to a blood vessel **56** and implanted within a patient's body **14**. An end **22** of the catheter **12** protrudes from the body **14** of the patient and includes a connector at the end **22** for connection of the catheter cleaning device **10**. The end **22** includes a thread **58** spiraling therearound. When preparing the catheter cleaning device **10** for use in removing an obstruction **30** from within the catheter **12**, the adapter **16** of the catheter cleaning device **10** is moved in the direction indicated by the arrow labeled with the numeral **60** towards the end **22** of the catheter **12**. Once the adapter **16** is positioned against the end **22**, the catheter cleaning device **10** is turned clockwise as indicated by the arrow labeled with the numeral **62**. As the catheter cleaning device **10** is turned in this direction, the thread **48** on the inner side **50** of the adapter **16** is caused to engage the thread **58** spiraling around the end **22** of the catheter **12**. Once the threads **48** and **58** are fully engaged, the catheter cleaning device **10** is ready for use.

The guide member **28** is now moved along the length of the pair of opposing slots **24** in the direction of the arrow labeled with the numeral **64** until the guide member **28** reaches the bottom of the slots **24** and can not move any further. At this point the guide member **28** is aligned with the transverse slots **36** and the guide wire **26** is fully extended into the catheter **12**. The length of the guide wire **26** is substantially equal to the length of the catheter **12** such that when in the fully extended position, the

guide wire will extend to the opposite end of the catheter **12**. The catheter cleaning device **10** is thus able to clear any obstruction along the entire length of the catheter **12**.

When in this position, the guide wire **26** is able to contact the obstruction **30**. When the guide wire **26** contacts the obstruction **30**, the end **32** of the guide wire **26** contacting the obstruction **30** is caused to bow slightly. At this point, the person clearing the obstruction grasps the guide member **28** and turns the guide member **28** back and forth along the length of the transverse slots **36**. As the guide member **28** is turned, the guide wire **26** is also caused to turn back and forth, scraping the obstruction **30** as it turns. As the guide wire scrapes the obstruction **30**, the obstruction **30** is caused to break away from the sides of the catheter **12** and also break up into smaller pieces as indicate din the enlarged view shown in Figure 7. As the obstruction **30** breaks up, it is caused to exit the catheter **12** and is carried through the blood vessel **56** thus clearing the catheter **12** for use.

Once the obstruction **30** is cleared, the guide member **28** is moved along the length of the pair of slots **24** causing the guide wire **26** to be retracted from within the catheter **12**. The guide member **28** is moved until it reaches the second end **34** of the slots **24**. At this point the guide wire **26** is fully contained within the housing **20**. The catheter cleaning device **10** is then removed from its engagement with the catheter by turning the adapter **16** in a counterclockwise direction causing the threads **48** and **58** to become disengaged.

From the above description it can be seen that the catheter cleaning device of the present invention is able to overcome the shortcomings of prior art devices by providing a catheter cleaning device which is able to provide a non surgical means for breaking up an obstruction within and thus de-clogging a catheter and may be easily used by health care professionals to declog a catheter. The catheter cleaning device includes a guide wire which can be selectively extended into the distal end of the catheter, a guide member able to ride along the length of guide slots between the proximal and distal ends of the housing for moving the guide wire into and out of the catheter and an adapter for affixing the device to the proximal end of the catheter and guiding the guide wire into the catheter as it is extended into the lumen of the catheter. The guide wire of the catheter cleaning device is selectively extended to the distal end of the catheter by the guide member and the device further includes transversal guide slots in the housing for rotating the guide member and guide wire when fully extended into the catheter. The catheter cleaning device is also able to be manufactured to varying lengths whereby the length of the guide wire is substantially equal to the length of the catheter preventing the guide wire from extending beyond the distal end of the catheter. Furthermore, the catheter cleaning device of the present invention is simple and easy to use and economical in cost to manufacture.

It will be understood that each of the elements described above, or two or more together may also find a useful application in other types of methods differing from the type described above.

While certain novel features of this invention have been shown and described and are pointed out in the annexed claims, it is not intended to be limited to the details above, since it will be understood that various omissions, modifications, substitutions and changes in the forms and details of the device illustrated and in its operation can be made by those skilled in the art without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention.

Claims

What is claimed is new and desired to be protected by Letters Patent is set forth in the appended claims:

1. A catheter cleaning device for clearing a catheter of obstructions, said catheter cleaning device comprising:

a) an elongate hollow housing including first and second slots extending along opposing sides of said housing;

b) a guide member encircling said housing and including a bar extending across a diameter thereof and through both said first and second slots;

c) a guide wire extending from said bar; and

d) means for connecting said device to the catheter, said connecting means including a recess extending therethrough and wherein said guide member is movable between a first retracted position wherein said guide wire is retained within said housing and a second extended position wherein said guide wire is extended through said connecting means, into said catheter and contacting any obstruction within the catheter for clearing the obstruction from blocking the catheter.

2. The catheter cleaning device as recited in Claim 1, wherein said housing further comprises first and second lateral slots extending perpendicular to a respective one of said first and second slots at an end of said housing adjacent said connecting

means, wherein said first and second lateral slots allow for rotation of said guide member.

3. The catheter cleaning device as recited in Claim 1, wherein said guide member has a length substantially equal to a length of said catheter.

4. The catheter cleaning device as recited in Claim 2, wherein said guide member has a length substantially equal to a length of said catheter.

5. The catheter cleaning device as recited in Claim 3, the wherein an end of said guide wire is able to bow upon contacting the obstruction.

6. The catheter cleaning device as recited in Claim 4, wherein an end of said guide wire is able to bow upon contacting the obstruction so that said guide wire scrapes against the obstruction when said guide member is rotated within said first and second lateral slots.

7. The catheter cleaning device as recited in Claim 1, wherein said recess extending through said connecting means is funnel shaped for guiding said guide wire therethrough and into the catheter.

8. The catheter cleaning device as recited in Claim 7, wherein said connecting means includes a skirt extending from around said funnel shaped recess and

a thread spiraling around an inner side of said skirt for engaging a thread on an end of the catheter.

9. The catheter cleaning device as recited in Claim 1, wherein said guide wire is contained within said housing when said guide member is in said retracted position.

10. The catheter cleaning device as recited in Claim 6, wherein scraping of said guide wire against the obstruction causes the obstruction to break up into small pieces and be carried away in a vessel to which the catheter is connected.

11. A method of clearing an obstruction from within a catheter, comprising the steps of:

a) connecting a housing having a guide wire extending therein and movable along a length thereof to an end of the catheter;

b) moving the guide wire along the length of the housing until the guide wire extends into the catheter and against the obstruction;

c) rotating the guide wire causing the guide wire to scrape against the obstruction;

d) breaking the obstruction into smaller pieces able to be carried away in a vessel to which the catheter is connected;

e) removing the guide wire from within the housing; and

f) disconnecting the housing from the catheter.

12. The method as recited in Claim 11, wherein the guide wire is connected to a guide member and said step of moving the guide wire includes moving the guide member along the length of housing thereby causing the guide wire to move into the catheter.

13. The method as recited in Claim 12, wherein said step of retracting the guide wire back into the housing includes the step of moving the guide member along the length of the housing in a direction opposite to said step of moving the guide wire.

14. The method as recited in Claim 12, wherein the housing includes lateral slots extending perpendicular to the direction of movement of the guide wire and said step of rotating the guide wire includes the step of rotating the guide member within the lateral slots causing the guide wire to scrape against the obstruction thereby breaking the obstruction into smaller pieces and separating the obstruction from the catheter.

15. The method as recited in Claim 11, wherein said step of connecting the housing to the catheter includes the step of turning the housing in a clockwise direction thereby causing a thread spiraling around an inner side of the housing to engage a thread spiraling around an outer side of the catheter.

16. The method as recited in Claim 15, wherein said step of removing the housing from the catheter includes the step of turning the housing in a counterclockwise direction thereby causing the thread spiraling around an inner side of the housing to disengage from the thread spiraling around an outer side of the catheter.

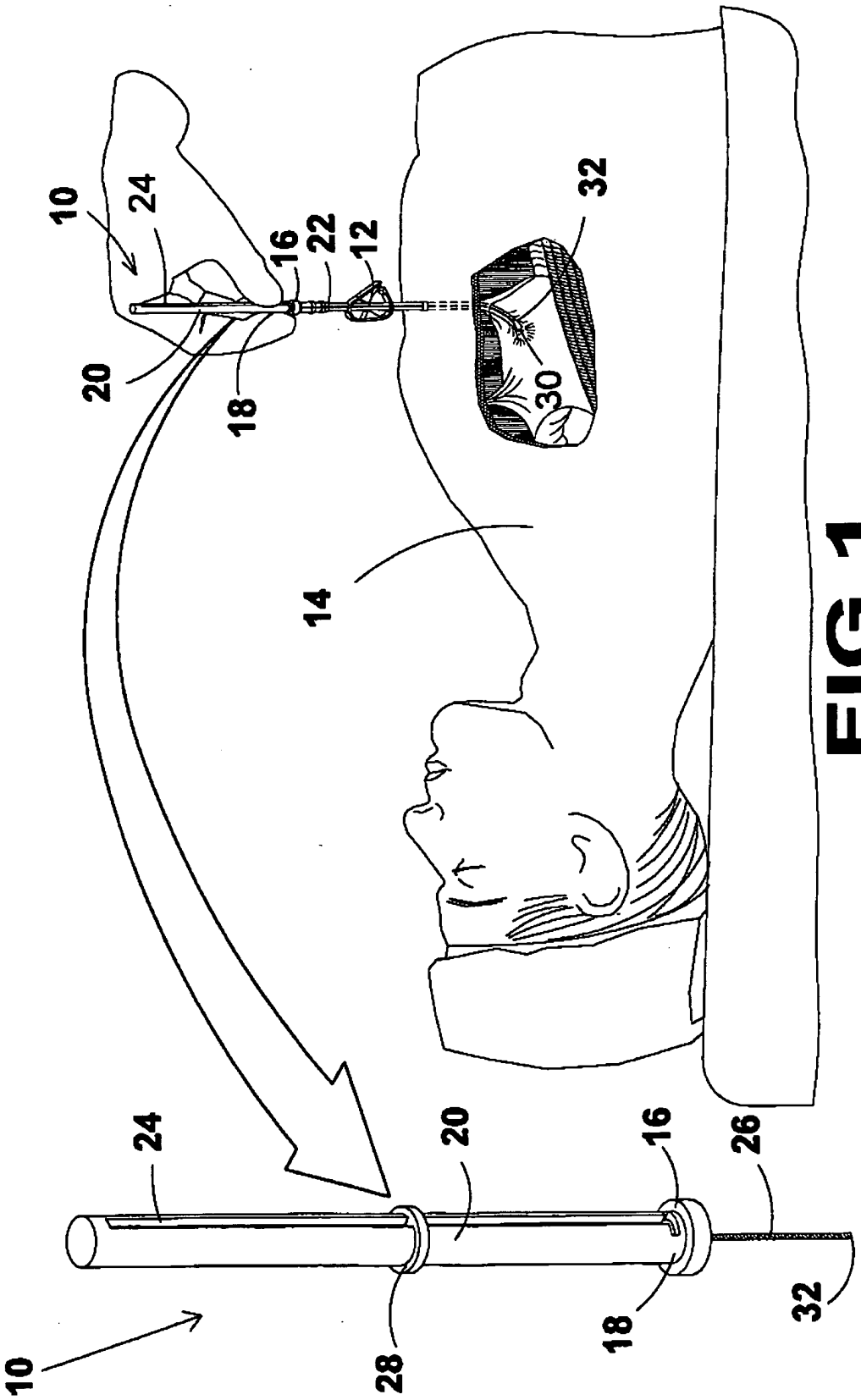


FIG 1

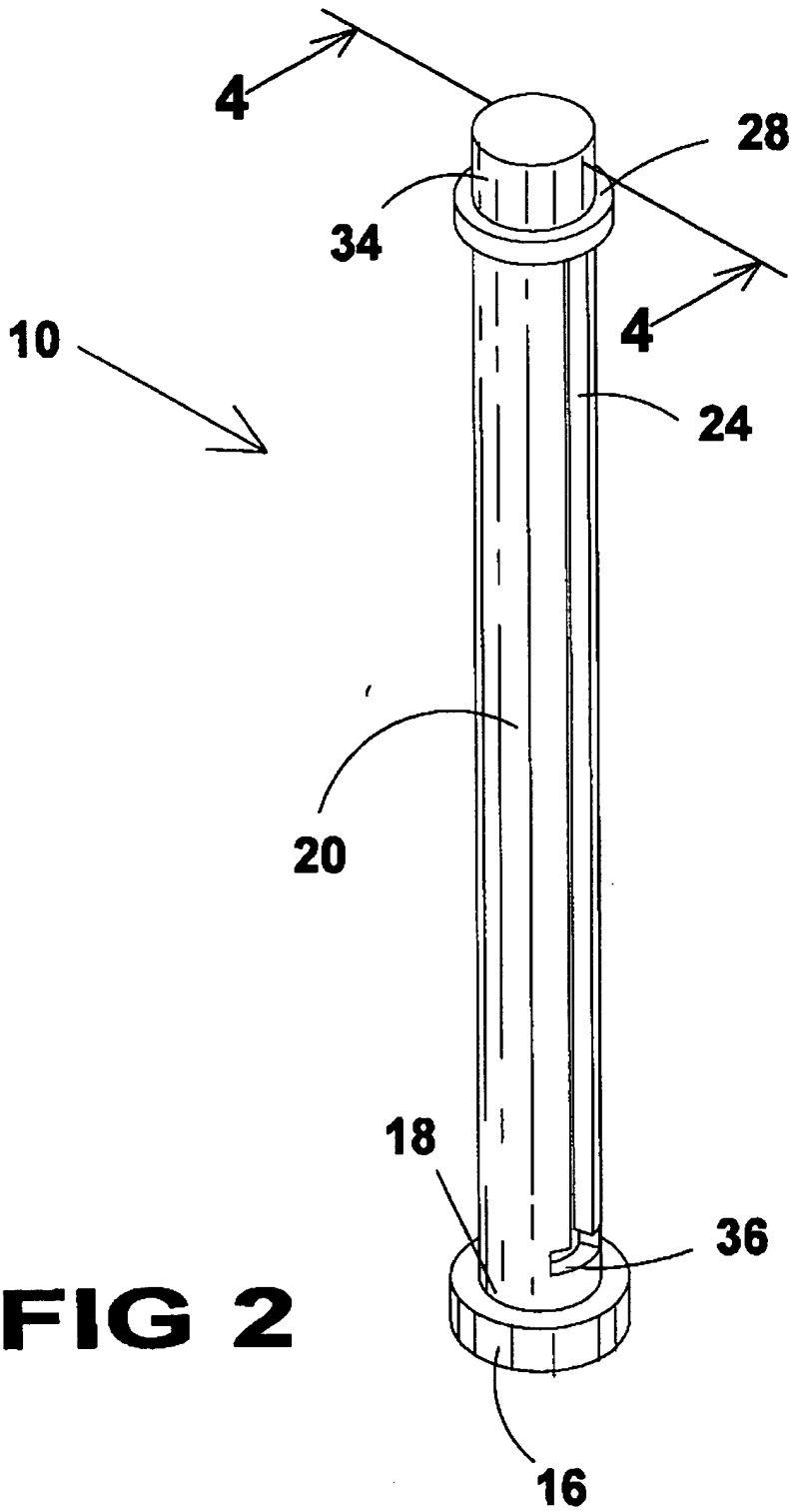


FIG 2

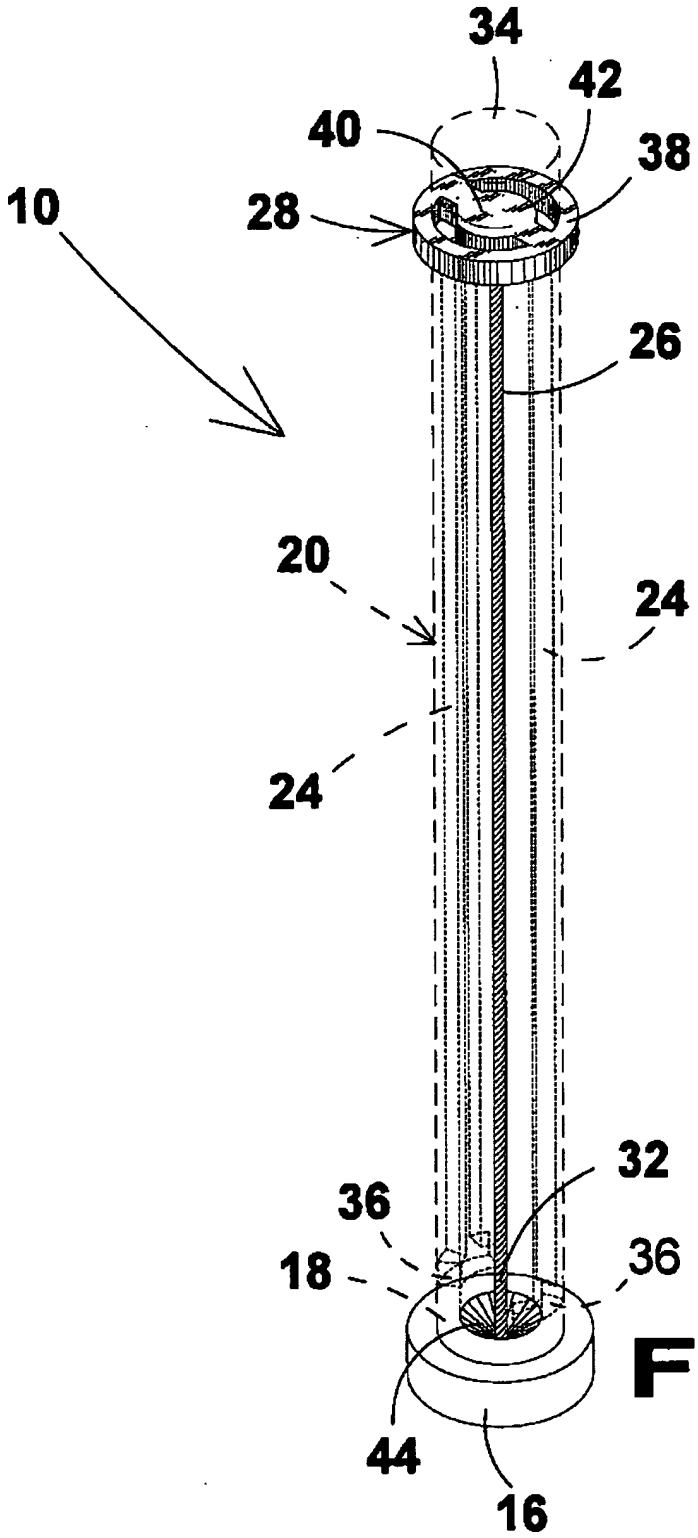


FIG 3

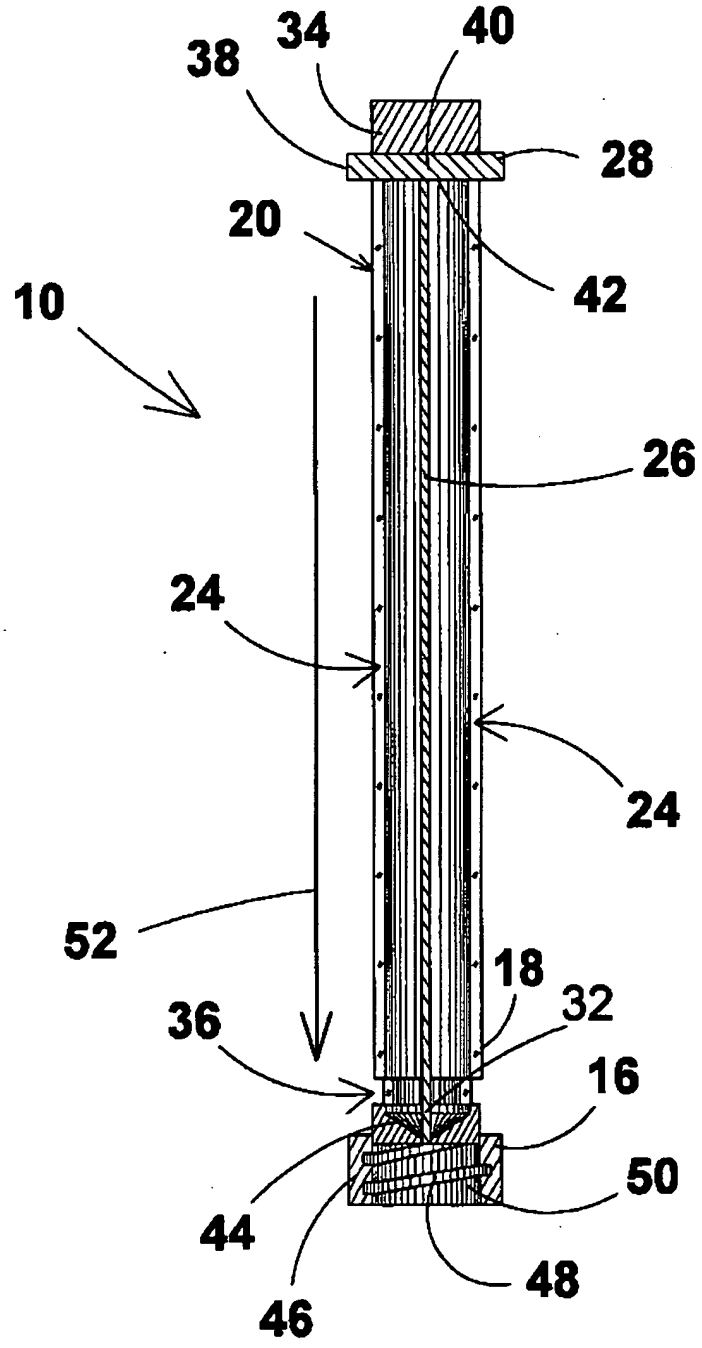


FIG 4

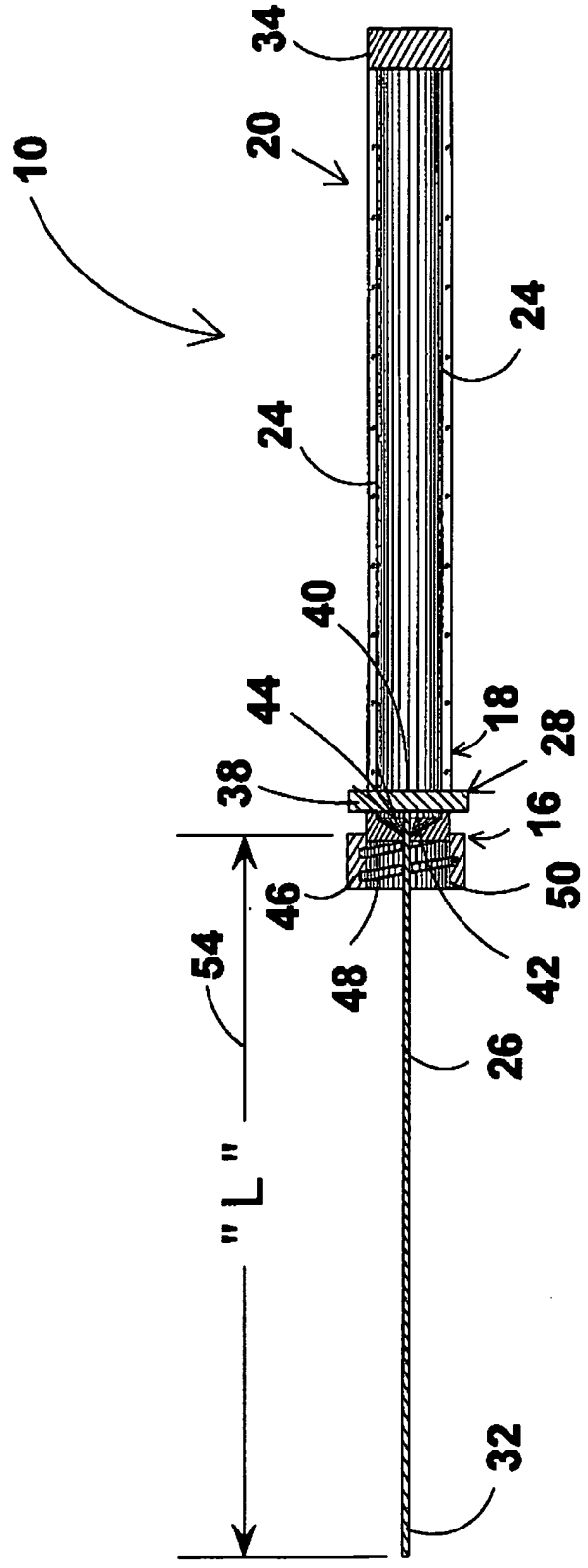


FIG 5

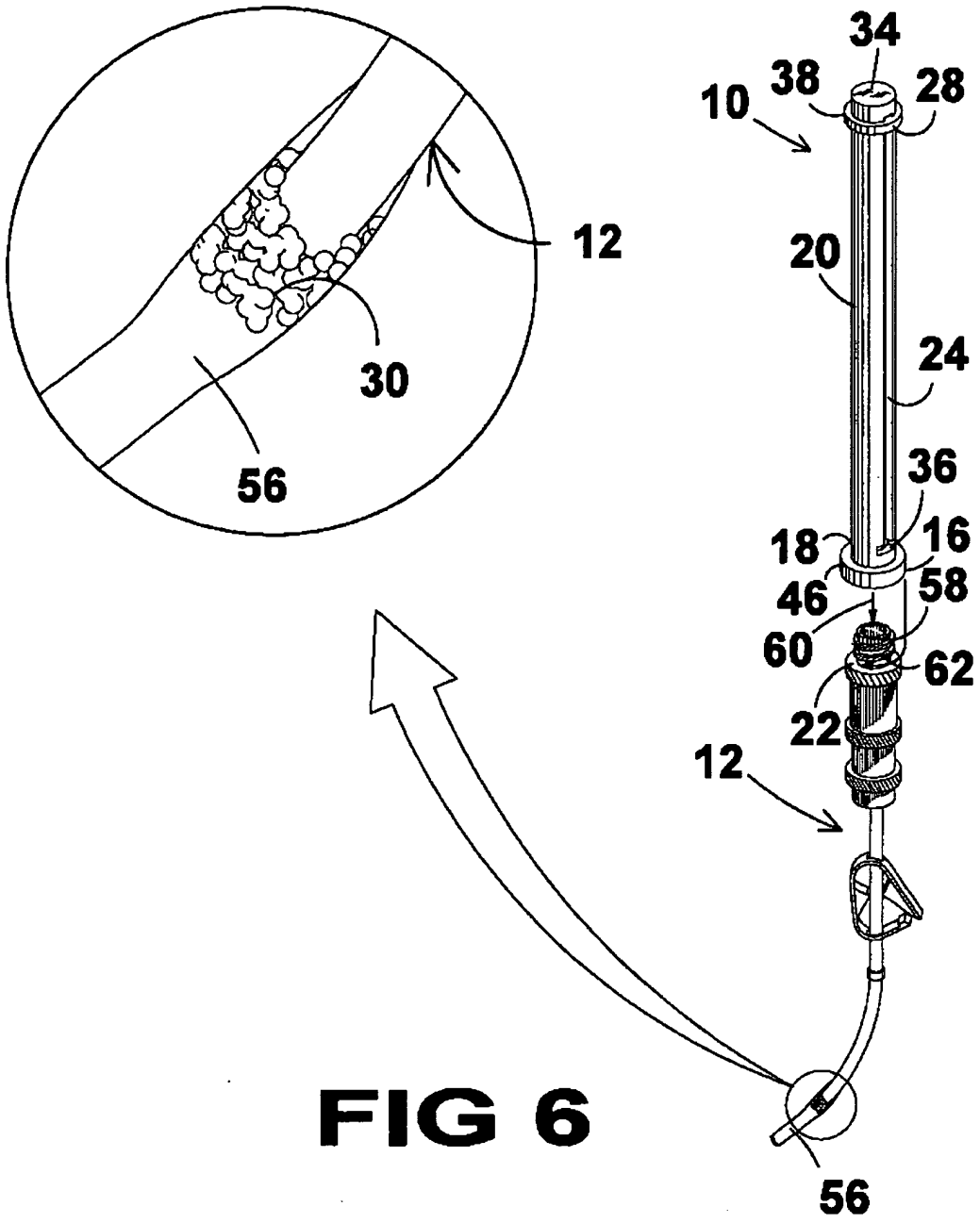


FIG 6

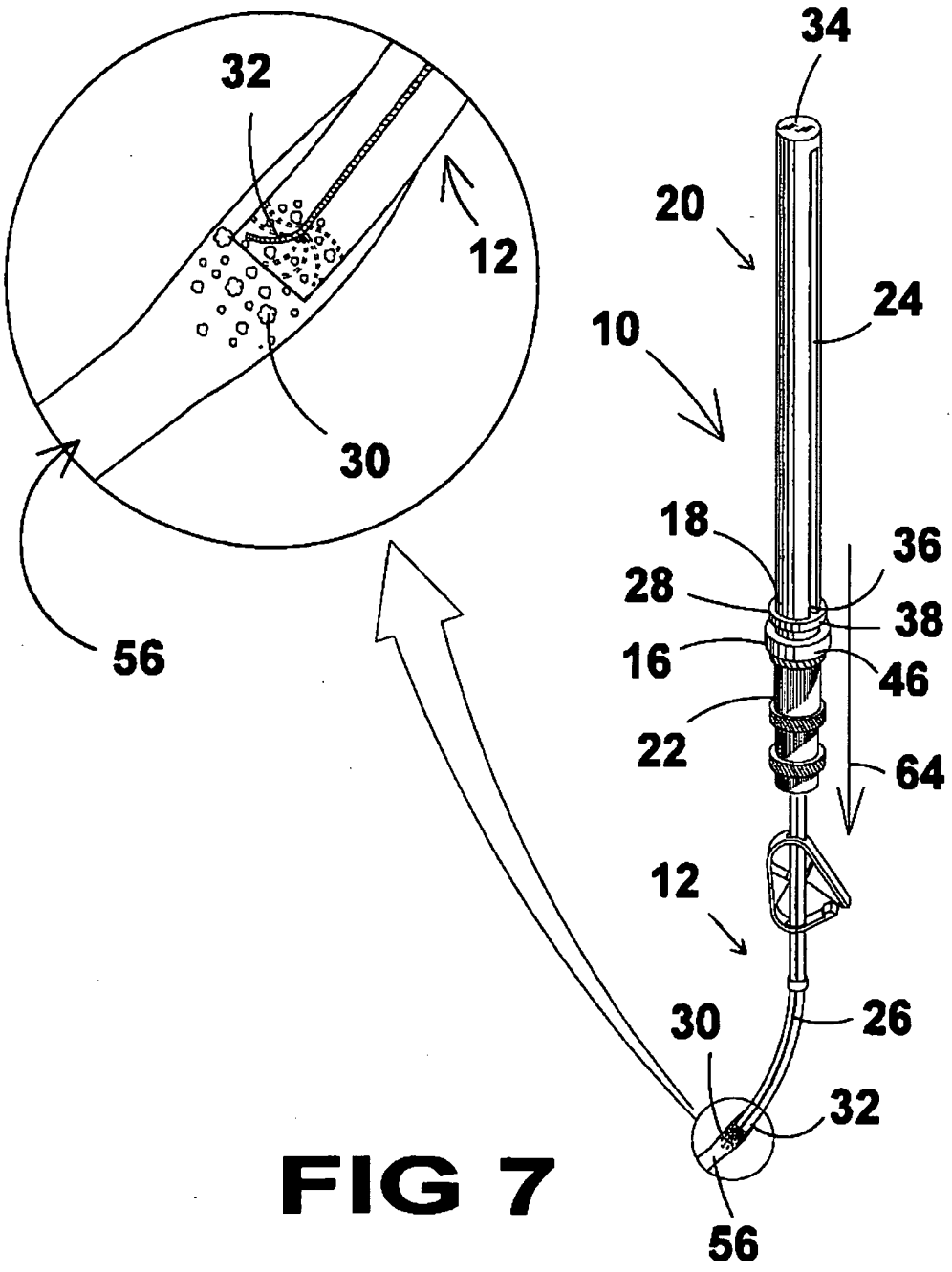


FIG 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US01/03713

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : A61M 25/00
US CL : 604/267

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 604/267, 264, 256, 158-161, 164.01, 164.13, 166.01, 170.01-170.03, 523, 528, 600/433-435, 585, 606/159, 167, 171, 185

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,894,056A (BOMMARITO) 16 January 1990, see figs. 1-3, abstract, col.2-4.	11-13,15-16
A	US 5514084A (FISHER) 07 May 1996, See entire patent.	1-16
A	US 5,782,848 A (Lennox) 21 July 1998, see entire patent.	1-16

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

*	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier document published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search 03 APRIL 2001	Date of mailing of the international search report 02 MAY 2001
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer LOAN H. THANH Telephone No. (703) - 308-0858

Form PCT/ISA/210 (second sheet) (July 1998)*